

AMENDMENTS TO THE CLAIMS

1. (Currently Amended) A method of controlling an inductively-powered operating unit for use in association with an inductive power transfer (IPT) system, the method comprising the steps of

frequency modulating ~~the a~~ current in a primary conductor circuit of the IPT system; and,

in the operating unit:

(a) detecting ~~the a~~ frequency of current in the primary conductor circuit;

(b) generating a local oscillator signal;

(c) using the local oscillator signal to detect a change in the frequency of the primary circuit current; and

(d) using the detected change to control the operating unit.

2. (Currently Amended) A method as claimed in claim 1 ~~including~~ further comprising the step of using the detected frequency to ascertain ~~the a~~ frequency of the local oscillator signal.

3. (Currently Amended) A method as claimed in claim 1 ~~or claim 2~~ wherein the step of generating the local oscillator ~~includes~~ further comprises the step of:

generating a local oscillator of a known frequency with respect to ~~the an~~ unmodulated frequency of the primary circuit current.

4. (Currently Amended) A method as claimed in ~~any one of claims claim 1 or claim 3~~ wherein the step of detecting a change in the frequency of the primary circuit current ~~includes~~ further comprises the step steps of:

subtracting the local oscillator signal from the detected frequency to provide an information signal[[,]]; and

detecting a change in the frequency of the information signal.

5. (Currently Amended) A method as claimed in ~~any one of claims~~ claim 1 or ~~claim 3~~ wherein the step of detecting a change in the frequency of the primary circuit current ~~includes~~ further comprises the step ~~steps~~ of:

using the local oscillator signal to alias down the detected frequency to provide an information signal[[,]]; and

detecting a change in the frequency of the information signal.

6. (Currently Amended) A method as claimed in ~~claim 4~~ ~~or claim 5~~ wherein in the step of ~~aliasing~~ ~~or the step of~~ subtracting comprises the step of using a sample and hold circuit to sample the detected frequency signal to provide the information signal.

7. (Currently Amended) A method as claimed in ~~claim 6~~ including further comprising the step of sampling the detected frequency at the frequency of the local oscillator signal.

8. (Currently Amended) A method as claimed in ~~any one of claims~~ claim 4 to 7 including further comprising the step of detecting the frequency of the information signal by counting the number of cycles or part cycles of an oscillating signal of constant frequency in each cycle or part cycle of the information signal.

9. (Currently Amended) A method as claimed in ~~claim 8~~ including further comprising the step of counting the number of cycles or part cycles of the current in the primary conductor circuit in each cycle or part cycle of the information signal.

10. (Currently Amended) A method as claimed in ~~any one of the preceding claims including claim 1, further comprising~~ the step of calibrating the frequency of the local oscillator signal with the frequency of the current in the primary conductor circuit.

11. (Currently Amended) A method as claimed in claim 10 wherein the step of calibrating further comprises ~~calibration includes~~ the steps of:

detecting the frequency of the information signal[[,]]; and

~~analysing~~ analyzing the frequency over a pre-determined time period to obtain a frequency reference[[,]]; and

comparing the frequency reference with a datum[[,]]; and

increasing or decreasing the local oscillator frequency to effect calibration.

12. (Currently Amended) A method as claimed in ~~any one of the preceding claims including claim 1, further comprising~~ the ~~step~~ steps of:

establishing at least one pre-determined threshold associated with the frequency of the information signal[[,]]; and

comparing the frequency of the information signal with the threshold to provide a digital output signal for control of the operating unit.

13. (Currently Amended) A method as claimed in ~~any one of the preceding claims including claim 1, further comprising~~ the steps of:

modulating the primary conductor current to provide an instruction to the operating unit[[,]]; and

detecting one or more frequency changes associated with the modulation at the operating unit to decode the instruction[[,]]; and

controlling the operating unit in accordance with the instruction.

14. (Currently Amended) A controlled inductively powered unit for use in association with an inductive power transfer (IPT) system having a primary conductor circuit with a modulated current, the operating unit ~~including~~ comprising:

(a) a signal detection means unit operable to detect ~~for detecting the~~ a frequency of current in the primary conductor circuit;

(b) a local oscillator means unit operable to provide ~~for providing~~ a local oscillator signal;

(c) a signal processing means unit operable ~~adapted~~ to use the local oscillator signal to detect a change in the frequency of the primary conductor current; and

(d) a control means unit operable to control the operating unit dependent on the detected change.

15. (Currently Amended) A controlled inductively powered unit as claimed in claim 14 wherein the signal processing ~~means unit ascertains~~ ascertain the a frequency of the local oscillator using the detected frequency provided by the signal detection ~~means unit~~.

16. (Currently Amended) A controlled inductively powered unit as claimed in claim 14 ~~or claim 15~~ wherein the local oscillator ~~means unit~~ provides a local oscillator signal of a known frequency with respect to the unmodulated frequency of the primary circuit current.

17. (Currently Amended) A controlled inductively powered unit as claimed in ~~any one of claims claim 14 to 16~~ wherein the signal detection ~~means unit~~ provides a detected frequency signal representative of the frequency of the primary conductor current and ~~includes~~ comprises a comparison ~~means unit~~ to compare the frequency of the local oscillator signal with the frequency of the detected frequency signal to ascertain the frequency of the local oscillator signal.

18. (Currently Amended) A controlled inductively powered unit as claimed in ~~any one of claims claim 14 to 17~~ wherein the signal detection ~~means unit~~ provides a detected frequency signal representative of the frequency of the primary conductor current and ~~includes~~ comprises a frequency subtraction ~~means unit operable~~ to subtract the local oscillator signal from the detected frequency signal and provide an information signal for detecting the change in frequency of the primary conductor current.

19. (Currently Amended) A controlled inductively powered unit as claimed in ~~any one of claims claim 14 to 18~~ wherein the signal detection ~~means unit~~ provides a detected frequency signal representative of the frequency of the primary conductor current and ~~includes~~ comprises a sampling ~~means unit~~ which samples the detected frequency signal and provides an information signal for detecting the change in frequency of the primary conductor current.

20. (Currently Amended) A controlled inductively powered unit as claimed in claim 18 ~~or claim 19~~ wherein the frequency subtraction ~~means unit or the sampling means~~ samples the detected frequency signal at the frequency of the local oscillator.

21. (Currently Amended) A controlled inductively powered unit as claimed in ~~any one of claims claim 18 to 20, including further comprising~~ a counter to detect the frequency of the information signal by counting the number of cycles or part cycles of an oscillating signal of constant frequency in each cycle or part cycle of the information signal.

22. (Original) A controlled inductively powered unit as claimed in claim 21 wherein the counter counts the number of cycles or part cycles of the primary conductor current circuit in each cycle or part cycle of the information signal.

23. (Currently Amended) A controlled inductively powered unit as claimed in ~~any one of claims claim 18 to 22, including further comprising~~ a comparator having a pre-determined threshold at one input and a signal representative of the frequency of the information signal at another input to provide a digital output signal for control of the operating unit.

24. (Currently Amended) A controlled inductively powered unit as claimed in ~~any one of claims claim 14 to 23 including~~ further comprising a calibration means unit operable to calibrate the local oscillator signal frequency with the frequency of the current in the primary conductor circuit.

25. (Currently Amended) An inductive power transfer (IPT) system including a primary conductor circuit and one or more controlled inductively powered units as claimed in ~~any one of claims claim 14 to 24~~ associated with the primary conductor circuit and adapted to receive power inductively from the primary conductor circuit, wherein the primary conductor circuit ~~includes~~ comprises a frequency modulation means unit operable to modulate the frequency of current in the primary conductor circuit.

26. (Currently Amended) A roadway lighting system comprising a plurality of separately controllable road-studs, each road-stud ~~including~~ comprising:

a light emitting element and being powered inductively via a primary conductor circuit buried under or in a roadway,

a frequency modulation ~~means~~ unit adapted to modulate current in the primary conductor circuit, and

wherein each controllable road-stud ~~includes~~ comprises:

(a) ~~a signal detection means for detecting~~ unit operable to detect the frequency of current in the primary conductor circuit; (b)

a local oscillator ~~means for providing~~ unit operable to provide a local oscillator signal; (c)

a signal processing ~~means~~ unit adapted to use the local oscillator signal to detect a change in the frequency of the primary conductor current; and (d)

a control ~~means~~ unit operable to control the operating unit dependent on the detected change.

27. (Currently Amended) A roadway lighting system as claimed in claim ~~[[24]]~~ 26 wherein the roadway is an automobile roadway.

28. (Currently Amended) A roadway lighting system as claimed in claim ~~[[24]]~~ 26 wherein the roadway is an aircraft runway or taxiway.

29. (Currently Amended) A roadway lighting system as claimed in claim ~~[[24]]~~ 26 wherein the roadway is a sidewalk or footpath.

30. (Currently Amended) A narrow band modulated data transmission system for controlling one or more light emitting units, the system ~~including comprising~~:

a transmission ~~means~~ unit operable to transmit a modulated signal, and ~~the or each of the one or more~~ light emitting units ~~unit including comprising~~:

a reception ~~means~~ unit tuned to receive the modulated signal,

a detection ~~means~~ unit operable to detect the data present in the received signal, and

wherein the total power to operate the light emitting unit is derived from the received signal.

31. (Currently Amended) A narrow band modulated data transmission system as claimed in claim ~~[[28]]~~ 30 wherein the transmitted signal is a frequency modulated signal.

32. (Currently Amended) A method of controlling one or more light emitting units comprising the steps of:

transmitting a narrow band modulated signal;

receiving the modulated signal at a light emitting unit;

detecting ~~the~~ a data present in the received signal;

controlling the light emitting unit dependent on the detected data[.,,]; and

using the received signal to provide the total power to operate the light emitting unit.

33.(Currently Amended) A method as claimed in claim [[30]] ~~32 including further comprising~~ the step of transmitting a narrow band frequency modulated signal.

34. (Currently Amended) A method of controlling traffic on a road, the method including the steps of;

incorporating a road way lighting system comprising a plurality of separately controllable road-studs into or onto the road, each road-stud ~~including comprising~~ a light emitting element and being powered inductively via a primary conductor circuit buried under or in a roadway, a frequency modulation ~~means unit~~ adapted to modulate current in the primary conductor circuit, and wherein each controllable road-stud ~~includes comprises:~~ ~~(a)~~ a signal detection ~~means unit operable to detect for detecting the~~ a frequency of current in the primary conductor circuit; ~~(b)~~ a local oscillator ~~means unit operable to provide for~~ providing a local oscillator signal; ~~(c)~~ a signal processing ~~means unit~~ adapted to use the local oscillator signal to detect a change in the frequency of the primary conductor current; and ~~(d)~~ a control ~~means unit operable~~ to control the operating unit dependent on the detected change, and

modulating the frequency of current in the primary conductor circuit to initiate a pattern of operation of each controllable road-stud such that the plurality of road-studs provide a message to users of the road.

35. (Currently Amended) A method as claimed in claim [[32]] ~~34 including further comprising~~ the step of modulating the frequency such that the message includes sequential flashing of the controllable road-studs to indicate a direction.

36. (Currently Amended) A method as claimed in claim [[32]] ~~34~~ including further comprising the step of modulating the frequency such that the message includes sequential flashing of the controllable road-studs to indicate a speed limit.

37. (Currently Amended) A method as claimed in claim [[33]] ~~35~~ or claim 34 wherein the step of sequential flashing involves activating all the light emitting elements and sequentially deactivating a minority of the light emitting elements.

38. (Currently Amended) A controllable road-stud system ~~including comprising~~:

a power supply for generating a substantially sinewave current in a primary conductive path characterised wherein ~~in that the~~ a frequency of the current can be modulated,

a plurality of active nodes tuned to the power supply frequency located at specific points along the primary conductive path,

a road-stud tuned to the power supply frequency located in close proximity to each of the active nodes, each road-stud including:

a pick-up coil with a tuning capacitor,

a rectification means for producing unit operable to produce a DC source of power,

a control means for controlling unit operable to control ~~the~~ a power flow from the primary conductive path to the road-stud,

a light source ~~means~~ in series with a controllable switch connected across the DC source of power and active to switch the light source ~~means~~ on or off,

a signal detection means unit for detecting the operable to detect a frequency of the current in the primary conductive path or the current in the pick-up coil,

~~means for producing~~ a unit operable to produce a local oscillator signal at a known frequency relative to the detected frequency,

~~means for tracking~~ a tracking unit operable to track the local oscillator signal frequency against variations in frequency or components ~~means~~ unit operable to produce ~~for producing~~ a signal representative of the difference frequency between the detected frequency and the frequency of the local oscillator signal,

a counting unit operable to count ~~means for counting the~~ a number of cycles of the detected frequency in one cycle of the difference signal,

a comparator ~~means for determining unit operable to determine~~ whether the counted number of cycles is greater or less than a comparison fixed number to provide a decoded output, and

a processor ~~means~~ unit operable to control the light source ~~means~~ on the road-stud according to the decoded output.

39. (Currently Amended) A controllable road-stud for use in association with an inductive power transfer (IPT) system having a primary conductive path with a frequency modulated current, the road-stud ~~including comprising~~:

~~means~~ a signal producing device operable to produce ~~for producing~~ a local oscillator signal in the road-stud of known accuracy with respect to ~~the~~ an unmodulated frequency of the current in the track,

~~means for using~~ a unit operable to use the local oscillator signal to detect changes in the frequency of the current in the primary conductive path,

~~means for converting~~ a conversion unit operable to convert the detected changes to digital form to produce binary output representative of the modulation of the frequency of the current in the primary conductive path,

a processing device for interpreting the binary output and

a driving switch means for switching a light source powered by the road-stud on or off as appropriate.

40. (Currently Amended) A controllable road-stud as claimed in claim ~~[[37]]~~ 39 wherein variations in the local oscillator frequency caused by component differences or changes in temperature or time are compensated for even though these changes may be significantly larger than the controlled frequency changes in the track current.

41. (Currently Amended) A controllable road-stud as claimed in claim ~~[[37]]~~ 39 or ~~claim 38~~ wherein the primary conductive path includes one or more active nodes.

42. (Currently Amended) A controllable road-stud as claimed in claim ~~[[39]]~~ 41 ~~including further comprising:~~

a pick-up coil, and

wherein variations in the tuning of the active node or the pick-up coil have substantially no affect on the ability of the apparatus to produce and process the binary output.

43. (Currently Amended) A controllable road-stud as claimed in ~~any one of claims 37 to~~ claim 39 wherein the modulation of the current in the primary conductive path is in a range of substantially 1-1.5% of the unmodulated frequency of the current in the primary conductive path.

44. (Currently Amended) A controllable road-stud as claimed in ~~any one of claims 37 to~~ claim 39 wherein the light source is capable of displaying more than one colour or a plurality of light sources are provided, and the processor may selectively switch that colour or those colours on or off in a desired sequence or pattern.

45. (Currently Amended) A road-stud system including a controllable road-stud as claimed in ~~any one of claims 37 to~~ claim 39, further comprising and one or more uncontrolled road-studs,

wherein all the road-studs being powered from the same primary conductive path and all the road-studs ~~functioning~~ function without affecting the each other.

46. (Currently Amended) A road-stud system as claimed in claim [[43]] 45 wherein each controlled road-stud can operate one or more light sources of different colours in any desired sequence of patterns and colours.

47 – 51. (Cancelled)

52. (Currently Amended) A system for controlling one or more light emitting units, the system ~~including comprising:~~

a narrow band modulated data transmission system for controlling one or more light emitting units, ~~and an IPT system,~~ the data transmission system including comprising:

a transmission means unit operable to transmit a modulated signal, and ~~the or each of the one or more~~ light emitting ~~unit including units comprising:~~

a reception means unit tuned to receive the modulated signal, and

a detection means unit operable to detect the data present in the received signal, and

an IPT system, the IPT system providing power to the light emitting unit.

53. (New) A method as claimed in claim 5, wherein the step of aliasing further comprising the step of using a sample and hold circuit to sample the detected frequency signal to provide the information signal.

54. (New) A controlled inductively powered unit as claimed in claim 19 wherein the sampling unit samples the detected frequency signal at the frequency of the local oscillator.

55. (New) A method as claimed in claim 36, wherein the step of sequential flashing involves activating all the light elements and sequentially deactivating a minority of the light emitting elements.